at1124exam: Radicals and Squares (v929)

Question 1

Simplify the radical expressions.

$$\sqrt{98} \qquad\qquad \sqrt{99} \qquad\qquad \sqrt{75}$$

$$\sqrt{7 \cdot 7 \cdot 2} \qquad\qquad \sqrt{3 \cdot 3 \cdot 11} \qquad\qquad \sqrt{5 \cdot 5 \cdot 3}$$
$$7\sqrt{2} \qquad\qquad 3\sqrt{11} \qquad\qquad 5\sqrt{3}$$

Question 2

Find all solutions to the equation below:

$$2(x+4)^2 - 8 \;=\; 90$$

First, add 8 to both sides.
$$2(x+4)^2 = 98$$

Then, divide both sides by 2.
$$(x+4)^2 = 49$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 4 = \pm 7$$

Subtract 4 from both sides.
$$x = -4 \pm 7$$

So the two solutions are $x = 3$ and $x = -11$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 14x = 95$$

$$x^2 - 14x + 49 = 95 + 49$$
$$x^2 - 14x + 49 = 144$$
$$(x - 7)^2 = 144$$
$$x - 7 = \pm 12$$
$$x = 7 \pm 12$$
$$x = 19 \quad \text{or} \quad x = -5$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x - h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 4x^2 + 24x + 41$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 4 .
$$y = 4(x^2 + 6x) + 41$$

We want a perfect square. Halve 6 and square the result to get 9 . Add and subtract that value inside the parentheses.
$$y = 4(x^2 + 6x + 9 - 9) + 41$$

Factor the perfect-square trinomial.
$$y = 4((x + 3)^2 - 9) + 41$$

Distribute the 4.
$$y = 4(x + 3)^2 - 36 + 41$$

Combine the constants to get **vertex form**:

$$y = 4(x + 3)^2 + 5$$

The vertex is at point $(-3, 5)$.